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Excessive labeling technique provides a highly sensitive fluorescent probe for real-time monitoring of biodegradation of biopolymer pharmaceuticals in vivo

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Abstract

© 2014 Park-media, Ltd. Recombinant proteins represent a large sector of the biopharma market. Determination of the main elimination pathways raises the opportunities to significantly increase their half-lives in vivo. However, evaluation of biodegradation of pharmaceutical biopolymers performed in the course of pre-clinical studies is frequently complicated. Noninvasive pharmacokinetic and biodistribution studies in living organism are possible using proteins conjugated with near-infrared dyes. In the present study we designed a highly efficient probe based on fluorescent dye self-quenching for monitoring of in vivo biodegradation of recombinant human butyrylcholinesterase. The maximum enhancement of integral fluorescence in response to degradation of an intravenously administered enzyme was observed 6 h after injection. Importantly, excessive butyrylcholinesterase labeling with fluorescent dye results in significant changes in the pharmacokinetic properties of the obtained conjugate. This fact must be taken into consideration during future pharmacokinetic studies using in vivo bioimaging.

Keywords

Biodegradation, Butyrylcholinesterase, Fluorescent probe, In vivo bioimaging, Pharmacokinetics, Proteolysis, Self-quenching